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Peck, Dave; Dow, Mike; Goodall, William

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Statistical Packages and Clinical Psychology Research

Dave Peck, Mike Dow and Will Goodall
Email: dfpeck@btinternet.com

Will Goodall is in the Department of Psychiatry, University of Dundee, Dundee, DD1 9SY

Mike Dow and Dave Peck recently retired from the Department of Psychology, University of Stirling, Stirling, FK9 4LA

A survey of clinical psychology services in Scotland was conducted to determine the availability and use of statistical software packages. Few services use commercially available or free software. The authors recommend several free packages.

Introduction

Research is widely regarded as an integral and important part of the work of clinical psychologists in the UK (British Psychological Society, 2013). However, several studies have indicated that only a minority of clinical psychologists in the US and in the UK have published research in peer reviewed journals (Norcross, Karpiak, & Santoro, 2005; Thomas, Turpin, & Meyer, 2002). Moreover, only a minority of staff who teach on clinical psychology programmes are research active (Newman & McKenzie, 2011).

There are many bureaucratic barriers to conducting research in NHS clinical psychology departments, many of which have been outlined by Peck & Jones (2004). An additional more practical reason for low research activity may be poor access to general statistical packages. There are many commercial packages available (e.g. SPSS, Minitab, Stata) but they tend to be expensive to purchase initially, and annual subscriptions can be high. At a time of financial constraints in the NHS, purchasing such packages by clinical psychology services is likely to prove problematic. One solution to this problem may be to use some of the many free statistical packages on the Internet. It is not known how much use is made of free statistical packages in UK clinical psychology, nor how useful they are perceived to be. Accordingly a survey was conducted to examine these issues.

Aims

The main aims of this survey were threefold:
1. To determine which statistical packages, commercial and free, are being used in clinical psychology research in Scotland.
2. To explore barriers to using statistical packages.
3. To compile a list of recommended free statistical packages.

Method

A survey was conducted in which all heads of National Health Service (NHS) clinical psychology services in Scotland were issued with a brief questionnaire, and asked to forward it to all their clinical psychology staff. The responses were returned online, or were printed and posted to the authors. The questionnaire sought to determine ease of access to statistical packages; which commercial packages were being used; which free packages had been employed; and if respondents could recommend free software that they were familiar with. Simple sociodemographic information was also requested, in particular in which health board area and in which speciality the respondents worked.

Results

Responses

NHS Scotland comprises 11 mainland regional NHS Boards. The Area Heads of Clinical Psychology Services across each of those regions were contacted in the first instance with a request to distribute details of the survey to all clinical psychologists, across all specialties and grades. A total of 57 responses were received from most regional clinical psychology services in Scotland, the main exception being Greater Glasgow. Lothian submitted 37 responses (65 per cent of the total). Overall this is a disappointing response rate from a clinical psychology workforce in Scotland of over 800. Responses were obtained from all specialities; however, very few were received from those working in older adults and in learning disabilities (two in each case).

Commercial packages
The only commercial package currently in use was SPSS, available to 32 of the respondents (56 per cent). Fourteen of the SPSS users (44 per cent) reported that the costs came out of the departmental budget, while the remainder were unclear about the funding source. Having access to SPSS was not related to the area in which the service was based (Lothian vs other areas; Fisher's Exact p=0.41), nor to clinical speciality (adult vs child vs health vs other; Fisher's Exact p=0.10).

Twelve of the total (21 per cent) stated that they were able to obtain access to SPSS from another department, but few did so. Only five (9 per cent) believed that their Health Board held a site licence. Nineteen (33 per cent) were able to obtain access to statistical packages at a university, but eight of them stated that such access was difficult.

Free packages
Only three respondents (5 per cent) had used a free general statistical package; in each case this was R. Others stated that they had used freeware with a more narrow application: G*Power (for sample size estimation) was used by three respondents; RevMan (for meta-analysis) was used by three; and Survey Monkey (for devising survey questionnaires) was used by one. No respondent recommended a free general statistics package. Eighteen of the total (32 per cent) stated that there would be major obstacles to using free packages because of local NHS IT security measures.

Research activity
Only six respondents (11 per cent) said that they were currently involved in a quantitative research project. The main reasons for not being involved in quantitative research were being too busy clinically (27, or 47 per cent), research is not done in my department or it is not in my contract (9, or 16 per cent), or a preference for qualitative approaches (3, or 5 per cent). Nine (16 per cent) stated that lack of access to statistical packages was a major obstacle to involvement in research.

Discussion

The response rate to the questionnaire was disappointing with only 57 returned out of a possible total of over 800, a response rate of about 7 per cent. Learning disabilities and older adult services were severely under-represented. This is partly because not all heads of service agreed to circulate the questionnaire. It is also possible that many people who were not involved in quantitative research decided not to complete the questionnaire when they saw that the project was enquiring about statistical packages. This low response rate clearly raises questions about the reliability and validity of the data, in particular how far the conclusions could apply to other clinical psychology services in Scotland and elsewhere in the UK.

Nevertheless the responses that were received present a highly consistent picture, in terms of low overall use of statistical packages, using only one commercial package, little use of free software, and little participation in research. This high level of consistency suggests that the findings of this study may portray an accurate picture of the use of statistics and of the level of research activity across clinical psychology in the UK, and it may therefore be permissible to draw some tentative general conclusions.

It is notable that the only commercial package in use was SPSS. Presumably this is because SPSS is the main package that is taught in clinical psychology training programmes. This predominance of SPSS is unfortunate because there are many other cheaper and more user-friendly commercial packages, such as Minitab and Instat.

Quite correctly, the NHS goes to great lengths to protect IT systems from infection by viruses and from hacking. However a third of the respondents considered that these security measures would make it difficult for clinical staff to download free software. Clinical psychology staff should consider negotiating with their IT departments on how this security barrier could be adapted e.g. by using dedicated, non-networked machines for research data analysis.

Only three respondents had used general statistics freeware (R), and no other packages were recommended. The recommended freeware sites in the appendix below are therefore mainly those with which the authors are familiar, and which they have found to be useful in clinical psychology research.

Despite research being a core part of clinical psychology training, and being a key ingredient in the scientist-practitioner model to which the profession aspires, only six respondents (11 per cent) were actively engaged in research. This low level of research activity is consistent with the small number of journal publications authored by NHS clinical psychologists (Thomas et al., 2002). We hope that by publicising the value and availability of free statistical packages in this article, a key obstacle to conducting research can be overcome.

Appendix: Recommended free general statistics software

Most of the systems listed below can do all the basic statistical procedures (t, ANOVA, linear regression, non-parametrics, etc). If not, or if a system contains particularly useful or unusual features, this is highlighted. They are all very straightforward to use, except for R. Note that with many of these free packages, one can not save a file. The data will need to be kept in Excel or in a similar programme, and then copied and pasted into the free software.

Vassar Statistics

This is probably the best free statistics package for clinical psychology research. It includes very understandable advice and instructions; it is easy to use; and it is straightforward to interpret the results. Some statistical operations in Vassar allow direct data input, others require pasting from a database.

It includes programmes for all the usual statistics; and there is also a large array of very useful additional features such as a simple calculator, programmes for conversion to z scores and data transformations (e.g. to logs), and various probability and distribution functions. Some advanced methods (basic versions) are also included such as log linear analysis, logistic and multiple regression, and ROC curve analysis. Perhaps most useful is a simple randomisation test of the differences between means.

URL: vassarstats.net

R

This package was developed by statisticians for statisticians. Accordingly many clinical researchers may find it hard to use it. It will probably take much intensive study before analyses can begin, so unless there are a lot of analyses to be done it is probably not worthwhile to download it. Moreover the accompanying documentation is poor.

However, R is an excellent system which is why, despite its complexity, it is recommended here. It probably contains the widest range of statistical procedures and graphical features of any package, commercial or free. It does everything you will ever need, and more. But many of the features are rarely used in clinical psychology research. A big advantage with R is that one can save the files, without having to copy and paste.

URL: www.**r**-project.org/

GraphPad QuickCalcs

This free system was developed by GraphPad, who also produce three commercial packages (Instat, StatMate and Prism). QuickCalcs can do many of the standard statistics (but not ANOVA or correlation), and also contains p value interpretation, a random number generator, confidence interval calculations, post hoc tests, and corrections for multiple comparisons. The limited range of tests is presumably intended to safeguard their commercial interests.

The commercial packages can be used free for 30 days. Instat is probably the easiest of all available systems to use, and one should be able to complete all the necessary analyses in the free 30 days. It is able to carry out most of the statistics commonly used in clinical psychology research except stepwise regression procedures. There is a helpful integral guide.

URL: www.graphpad.com/quickcalcs/

OpenEpi

This site contains many of the common statistical procedures. Unfortunately it does not include correlation or regression, but it does provide links to lots of other sites that do (via Statpages.net). It is very easy to use, and the layouts for data input and output are exemplary.

A limitation is that you can not input raw data; rather, you insert data such as the mean and sd that have already been calculated. However this information is easy to obtain and transpose from Excel.

Additional features include an excellent calculator, power analysis, random number generator, and rapid links to PubMed and other internet sites.

URL: Openepi.com

Al-Therapy

In addition to statistical issues, this excellent site provides useful information on therapy, assessment and related topics. It includes all the basic statistical procedures including regression (but not multiple regression), repeated measures ANOVA, and non-parametric methods. Each statistical operation is preceded by a well written explanation. Of particular value are the procedures for assessing normality (including plots), the effect size outputs, and ROC curve analysis.

URL: Al-Therapy.com

Daniel Soper

This extensive site offers over 100 programmes, grouped into 29 categories. It covers all the basic tests, plus density functions, a variety of distributions, sample size estimates, hierarchical regression and lots more. It is easy to use, and brief but informative explanations are given for each test that you select. Of particular value are calculators for Fisher's Exact Test if there are more than 4 cells.

The main shortcoming with the programmes is that they can not handle raw data for most of the tests. You have to enter summary statistics instead. So the t test calculator won't actually calculate a t value; rather, it will calculate Cohen's d, p values, post hoc power, and confidence intervals, amongst others, from the data that you enter. This is not a significant problem, as Excel can readily produce the relevant summaries.

URL: danielsoper.com

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